

What is claimed is:

1. A device for forming a magnetic port in a hollow body having a lumen, the device comprising:
 - a component capable of producing a magnetic field and having an opening configured to be placed in communication with the lumen of the hollow body; and
 - a housing disposed on an exterior of the component, the housing providing a substantially sealed enclosure containing the component;wherein the housing is formed of a biocompatible material adapted to be implanted in a patient.
2. The device of claim 1, wherein the housing provides a hermetically-sealed enclosure containing the component.
3. The device of claim 1, wherein the housing comprises a plurality of members cooperating to provide the sealed enclosure containing the component.
4. The device of claim 3, wherein one housing member is a dish and another housing member is configured to close the dish and seal the component therein.
5. The device of claim 1, wherein the housing comprises a metallic material.
6. The device of claim 5, wherein the housing comprises a plurality of titanium members joined by welding.
7. The device of claim 1, wherein the housing includes an indicator of the polarity of the magnetic field produced by the component.
8. A device adapted to be coupled to tissue using magnetic force, the device comprising:

a first securing component capable of producing a magnetic field, the first securing component being adapted to attract a second securing component that is capable of producing a magnetic field; and

a magnetic force-increasing mechanism for increasing the magnetic force attracting the first and second securing components when the first securing component is positioned in proximity to the second securing component.

9. The device of claim 8, wherein the magnetic force-increasing mechanism has a magnetic permeability greater than 1.0.

10. The device of claim 9, wherein the magnetic force-increasing mechanism has a magnetic permeability greater than 100.

11. The device of claim 9, wherein the magnetic force-increasing mechanism is configured to alter the magnetic flux density of the first securing component

12. The device of claim 11, wherein the magnetic force-increasing mechanism is configured to concentrate magnetic flux in a desired location.

13. The device of claim 12, wherein the first securing component is plate-shaped and the flux concentration mechanism comprises a separate channel-shaped strip of material disposed along and forming an extension of at least one edge of the first securing component.

14. The device of claim 8, wherein when the first securing component is positioned a given distance from the second securing component the magnetic force attracting the components is from about 5 % to about 75 % higher than the magnetic force attracting the components without the flux concentration mechanism.

15. The device of claim 14, wherein when the first securing component is positioned a given distance from the second securing component the magnetic force attracting the components is at least 20 % higher than the magnetic force attracting the components without the flux concentration mechanism.

16. The device of claim 14, further comprising a second securing component sized and configured generally complementarily to the first securing component, wherein the second securing component is capable of producing a magnetic field that attracts the first securing component and includes a flux concentration mechanism.

17. The device of claim 16, wherein the first securing component includes a portion for mechanically engaging the second securing component device to couple the securing components mechanically and by magnetic force.

18. A device adapted to be coupled to a blood vessel having a lumen so as to produce a magnetic field adjacent the blood vessel, the device comprising:

at least one securing component sized and configured to be secured to a blood vessel having a lumen, the one securing component being capable of producing a magnetic field;

wherein the one securing component has an indicator that indicates the polarity of the magnetic field to a user carrying out a procedure on the blood vessel.

19. The device of claim 18, wherein the indicator comprises a visual marker on the one securing component that indicates a selected polarity of the magnetic field.

20. The device of claim 18, further comprising a delivery device supporting the one securing component, and wherein the indicator comprises a predetermined portion of the one securing component that is aligned with the delivery

device to ensure that the one securing component is located with the selected polarity oriented in a desired position.

21. The device of claim 18, further comprising a second securing component that produces a magnetic field and is attracted to the one securing component, wherein the second component also has an indicator that indicates the polarity of the magnetic field produced by the second component to ensure that the securing components are positioned to ensure their attraction.

22. The device of claim 21, wherein the one securing component is adapted to be coupled to a target vessel to form a magnetic port that communicates with the vessel lumen, and the second securing component is adapted to be coupled to the one securing component to form a vascular anastomosis using magnetic force.

23. The device of claim 18, wherein the one securing component comprises an electromagnet coupled to a power source.

24. The device of 23, wherein the electromagnet is contained in a protective housing.

25. A device for forming a port in a first hollow body having a lumen, the device comprising:

a securing component having an opening adapted to be placed in communication with an opening in the wall of the first hollow body so as to be in communication with the lumen of the first hollow body; and

a mechanical attachment portion configured to secure the component to the first hollow body in a desired position;

wherein the securing component is configured to produce a magnetic field adjacent the opening in the first hollow body.

26. The device of claim 25, wherein the mechanical attachment portion comprises a structure that is at least partially collapsible for delivery through the opening in the wall of the first hollow body and then expandable to engage the wall of the first hollow body.

27. The device of claim 26, wherein the collapsible structure comprises a tube with self-expanding arms that are generally coplanar for contacting the wall of the first hollow body when the arms are expanded.

28. The device of claim 27, wherein the tube defines an opening that is aligned with the opening in the securing component.

29. The device of claim 25, wherein the securing component has a laminated structure and includes a layer of biocompatible material to enhance sealing of the opening in the wall of the first hollow body.

30. The device of claim 29, wherein the attachment portion is secured to a separate member formed of a material capable of producing a magnetic field.

31. The device of claim 25, wherein the mechanical attachment portion is adapted to provide the sole attachment between the securing component and the first hollow body.

32. The device of claim 25, wherein the opening in the securing component has a shape selected from the group consisting of circular, elliptical, racetrack, football and canoe-shaped configurations.

33. A delivery device in combination with a component for forming an anastomosis, the combination comprising:

at least one component having an opening adapted to be placed in communication with a lumen of a vessel in a patient's body, the component being capable of producing a magnetic field; and

a delivery device including a support portion supporting the component and a retaining portion that is movable with respect to the support portion, wherein the retaining portion is placed in a first position to retain the component and is moved from the first position to release the component;

wherein the retaining portion is movable with respect to the support portion in a direction selected from the group consisting of axial and rotary directions.

34. The combination of claim 33, further comprising a portion for supporting a second component, and wherein the support portion and the retaining portion of the delivery device are configured to contact different areas of the component.

35. The combination of claim 33, wherein the retaining portion comprises a rotatable rod with a portion contacting the component.

36. The combination of claim 33, wherein the retaining portion comprises a wedge slidably disposed with respect to the support portion, the wedge contacting the component when the retaining portion is in the first position.

37. The combination of claim 33, wherein the delivery device has a delivery end adapted to support at least one component, and the delivery end is laterally offset with respect to a longitudinal axis of the delivery device.

38. The combination of claim 37, wherein the delivery end has a notch adapted to receive tissue as the device is being used to introduce the component into the lumen of a vessel.

39. The combination of claim 33, wherein the component comprises a magnetic material and the delivery device comprises a ferromagnetic material.

40. A method for increasing the magnetic force between first and second anastomotic securing components, the method comprising steps of:

(a) providing first and second anastomotic securing components each of which is capable of producing a magnetic field, the first and second securing components having respective openings adapted to be placed in communication with each other; and

(b) increasing the magnetic force between the first and second securing components by concentrating magnetic flux between the securing components.

41. The method of claim 40, wherein step (b) is performed by altering the construction of at least one of the first and second securing components to concentrate magnetic flux between the components.

42. The method of claim 40, wherein step (b) is performed by providing the first and second securing components with respective flux concentration mechanisms that are formed of a material having a higher magnetic permeability than air.

43. A method for coupling a securing component to a target vessel in order to form a magnetic port communicating with a lumen of the target vessel, the method comprising steps of:

(a) providing at least one securing component capable of producing a magnetic field and having an opening adapted to be placed in communication with the lumen of the target vessel;

(b) coupling the one securing component to the target vessel with the opening in the one securing component communicating with the target vessel lumen; and

(c) prior to completing step (b) confirming the orientation of the polarity of the magnetic field produced by the one securing component.

44. The method of claim 43, wherein step (c) is performed by pre-loading the securing component on a delivery device in a predetermined position that properly orients the polarity of the magnetic field.

45. The method of claim 44, wherein the delivery device removably supports the one securing component to allow removal and reloading of the component if the polarity is improperly oriented.

46. The method of claim 43, wherein step (a) is performed by providing first and second anastomotic securing components each of which is capable of producing a magnetic field, step (b) is performed by positioning the securing components against opposite surfaces of the wall of the target vessel, and step (c) is performed by checking a visual marker carried on at least one of the securing components.

47. A method for forming a magnetic port in a first hollow body located within a patient, the first hollow body having a lumen, the method comprising steps of:

(a) forming an opening in a wall of the first hollow body, the opening extending into the lumen of the first hollow body;

(b) providing a first securing component capable of producing a magnetic field and having an opening adapted to be placed in communication with the opening in the wall of the first hollow body; and

(c) coupling the first securing component to the first hollow body by a mechanical attachment to form a magnetic port in the first hollow body.

48. The method of claim 47, wherein the first securing component is coupled to the first hollow body solely by a mechanical attachment.

49. The method of claim 47, further comprising the steps of providing a second securing component capable of producing or being attracted by a magnetic field, joining the second securing component to a second hollow body, and coupling the second securing component to the magnetic port created according to step (c) to form an end-to-side anastomosis between the first and second hollow bodies.